AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claims 1-51 are cancelled.

52. (New) An optical waveguide, comprising:

a core, comprising an elongate region of relatively low refractive index;

a photonic bandgap structure arranged to provide a photonic bandgap over a range of wavelengths of light, the structure, in a transverse cross section of the waveguide, surrounding the core and comprising elongate relatively low refractive index regions interspersed with elongate relatively high refractive index regions; and

a relatively high refractive index boundary at the interface between the core defect and the photonic bandgap structure, the boundary having a thickness around the core such that, in use, light guided by the waveguide is guided in a transverse mode in which, in the transverse cross-section, more than 95% of the guided light is in the regions of relatively low refractive index in the waveguide.

53. (New) A waveguide as claimed in claim 52, in which the boundary has a thickness such that, in use, light guided by the waveguide is guided in a transverse mode in which, in the transverse cross-section, more than 1% of the guided light is in the regions of relatively low refractive index in the photonic bandgap structure.

54. (New) A waveguide as claimed in claim 52, in which the boundary has a thickness such that, in use, light guided by the waveguide is guided in a transverse mode in which, in the transverse cross-section, more than 50% of the guided light is in the region of relatively low refractive index in the core.

55. (New) A waveguide as claimed in claim 52, in which the boundary has a thickness such that, in use, light guided by the waveguide is guided in a transverse mode providing an F-factor of less than $0.23\mu m^{-1}$ for an operating wavelength of 1.55μm, less than an equivalent F-factor value scaled for a different operating wavelength or less than $0.7\Lambda^{-1}$ for structures having a periodic cladding and a pitch Λ.

56. (New) An optical waveguide, comprising:

a core, comprising an elongate region of relatively low refractive index;

a photonic bandgap structure arranged to provide a photonic bandgap over a range of wavelengths of light, the structure, in a transverse cross section of the waveguide, surrounding the core and comprising elongate relatively low refractive index regions interspersed with elongate relatively high refractive index regions; and

a relatively high refractive index boundary at the interface between the core defect and the photonic bandgap structure, the boundary having a thickness around the core such that, in use, light guided by the waveguide is guided in a transverse mode providing an F-factor of less than $0.23\mu m^{-1}$ for an operating wavelength of 1.55μm, less than an equivalent F-factor value scaled for a different operating wavelength or less than $0.7\Lambda^{-1}$ for structures having a periodic cladding and a pitch Λ.

57. (New) A waveguide according to claim 52, in which the boundary is anti-resonant at an operating wavelength of light.

58. (New) A waveguide as claimed in claim 52, in which the boundary has a substantially constant thickness around the core.

59. (New) A waveguide as claimed in claim 52, in which the boundary has a thickness that varies around the core, wherein the core boundary has a thickness t around at least a proportion y of the boundary, where $y > 0.5$.

60. (New) A waveguide as claimed in claim 52, in which the boundary comprises, in the transverse cross-section, a plurality of relatively high refractive index boundary veins connected end-to-end around the boundary between neighbouring boundary nodes, each boundary vein being connected between a leading boundary node and a following boundary node, with no nodes in between, and each boundary node being connected between two boundary veins and to a relatively high refractive index region of the photonic bandgap structure.

61. (New) A waveguide according to claim 60, wherein each boundary vein has a characteristic thickness substantially at the mid-point between the two boundary nodes to which it is connected.

62. (New) A waveguide according to claim 60, wherein the characteristic thickness of at least one boundary vein is at least 110% of the characteristic thickness of a plurality of the veins in the array of veins in the photonic band-gap structure.

63. (New) A waveguide as claimed in claim 52, in which the array has a characteristic primitive unit cell and a pitch Λ.

64. (New) A waveguide as claimed in claim 63, in which the boundary has a thickness t, wherein, $t = u\Lambda$ for a proportion of the boundary y, where $u > 0.06$ and $y > 0.5$.

65. (New) A waveguide as claimed in claims 52, in which the core boundary has a thickness t defined by

$\frac{a\lambda}{4\sqrt{n_{HI}^2 - n_{LO}^2}} \leq t \leq \frac{b\lambda}{4\sqrt{n_{HI}^2 - n_{LO}^2}}$, where a=0.5 and b=1.75 and n_{HI} and n_{LOW} are the refractive indices of the boundary and of the relatively low refractive index region of the core, respectively.

66. (New) A photonic crystal fibre, comprising:

an elongate, relatively low refractive index core;
an elongate photonic bandgap structure surrounding the core and comprising, in the transverse cross section, a lattice of relatively low refractive index regions separated by connected relatively high refractive index regions; and
a concentric boundary region, at the interface between the core and the photonic bandgap structure, the core boundary region being generally thicker around its circumference than regions of relatively high refractive index in the photonic bandgap structure.

67. (New) A waveguide according to claim 56, in which the boundary is anti-resonant at an operating wavelength of light.

68. (New) A waveguide as claimed in claim 56, in which the boundary has a substantially constant thickness around the core.

69. (New) A waveguide as claimed in claim 56, in which the boundary has a thickness that varies around the core, wherein the core boundary has a thickness t around at least a proportion y of the boundary, where $y > 0.5$.

70. (New) A waveguide as claimed in claim 56, in which the array has a characteristic primitive unit cell and a pitch Λ.

71. (New) A waveguide as claimed in claim 56, in which the core boundary has a thickness t defined by

$$\frac{a\lambda}{4\sqrt{n_{HI}^2 - n_{LO}^2}} \le t \le \frac{b\lambda}{4\sqrt{n_{HI}^2 - n_{LO}^2}}$$, where a=0.5 and b=1.75 and n_{HI} and n_{LOW} are the refractive indices of the boundary and of the relatively low refractive index region of the core, respectively.